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Thermomechanics in an Externally Heated Reactive Gas Hot spot DAVID R. KASSOY, University of Colorado, Boulder — The response of a finite volume of inert gas to spatially resolved, transient power addition on a time scale short compared to the local acoustic time has been described by Kassoy, J. Eng. Math., **68**, 249-262. Formal parameter asymptotic methods are employed to describe the thermodynamic changes caused by a relatively brief burst of thermal energy, as well as the induced mechanical response. Related methods are used in the present work to describe similar physical processes occurring in a heated reactive gas capable of a high activation energy reaction. Localized power deposition from an external source to a spherical volume of reactive gas causes **nearly** constant volume heat addition. The spatially distributed temperature and pressure increase together, accompanied by an induced low Mach number gas expansion and a concomitant small decrease in fluid density. The resulting low Mach number velocity of gas expelled from the sphere surface is the source of acoustic disturbances, confined to a thin shell surrounding the finite volume, on the short heating time scale. A spatially distributed thermal explosion is initiated on a much longer induction time scale within the hot spot. Thermodynamic and gas dynamic consequences of the subsequent chemical heat addition are identified. Results are compared with those of Vasquez-Esp' and Linan (CTM,**5**, 485-498) found from a more intuitive formulation using coordinate expansion asymptotic methods.

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